09/786097

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
PC270PR		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP 99/06333	27/08/1999	28/08/1998
Applicant		
MINISTERO DELL'UNIVERSITA' E DELLA RICER... et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

[ ] the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

[ ] contained in the international application in written form.

[ ] filed together with the international application in computer readable form.

[ ] furnished subsequently to this Authority in written form.

[ ] furnished subsequently to this Authority in computer readble form.

[ ] the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

[ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

3. [ ] **Unity of invention is lacking** (see Box II).

4. With regard to the **title,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**

[X] the text is approved as submitted by the applicant.

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. _____

[ ] as suggested by the applicant.

[ ] because the applicant failed to suggest a figure.

[ ] because this figure better characterizes the invention.

[X] None of the figures.

INTERNATIONAL SEARCH REPORT

Inter. .onal Application No
PCT/EP 99/06333

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C08L67/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C08L C08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 440 008 A (ICHIKAWA FUMIAKI ET AL) 8 August 1995 (1995-08-08) column 1, line 8-23 column 4, line 23-30	1-7
X	US 5 444 143 A (OHTA MASAHIRO ET AL) 22 August 1995 (1995-08-22) column 1, line 8-24 column 3, line 8-14 claim 5	1-7
A	WO 97 43329 A (EASTMAN CHEM CO) 20 November 1997 (1997-11-20)	1-20

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other' such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2000	09/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Von Kuzenko, M

2

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter. ional Application No
PCT/EP 99/06333

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 572 256 A (SHOWA HIGHPOLYMER) 1 December 1993 (1993-12-01) page 2, column 5-13 page 4, column 25-38	1-7, 16-20
Y	example 5	1-20

X	US 5 599 858 A (GEDON STEVEN C ET AL) 4 February 1997 (1997-02-04)	1-7, 16-20
Y	column 1, line 15-26 column 5, line 3-12 column 9, line 43 -column 10, line 15 column 12, line 32-58 claims 1,2,12	1-20

X	US 5 412 005 A (BASTIOLI CATIA ET AL) 2 May 1995 (1995-05-02) column 1, line 37-43 column 2, line 63-68 column 3, line 40; claims 1-3	1-7, 16-20

2

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter. onal Application No
PCT/EP 99/06333

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5440008 A	08-08-1995	DE 4418643 A	01-12-1994
		JP 7228678 A	29-08-1995
US 5444143 A	22-08-1995	EP 0603889 A	29-06-1994
		FI 935791 A	26-06-1994
		JP 7133344 A	23-05-1995
		US 5512653 A	30-04-1996
WO 9743329 A	20-11-1997	US 5661193 A	26-08-1997
		EP 0898591 A	03-03-1997
EP 0572256 A	01-12-1993	JP 6041288 A	15-02-1994
		KR 129794 B	07-04-1998
		US 5310782 A	10-05-1994
US 5599858 A	04-02-1997	US 5446079 A	29-08-1995
		US 5292783 A	08-03-1994
		US 5900322 A	04-05-1999
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		AT 150058 T	15-03-1997
		AU 696544 B	10-09-1998
		AU 4557496 A	06-06-1996
		AU 664831 B	07-12-1995
		AU 9105091 A	25-06-1992
		BR 9107138 A	05-04-1994
		CA 2095536 A	31-05-1992
		CN 1062740 A	15-07-1992
		CN 1183426 A	03-06-1998
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		DE 69125170 D	17-04-1997
		EP 0559785 A	15-09-1993
		EP 0736557 A	09-10-1996
		EP 0950678 A	20-10-1999
		FI 932450 A	28-05-1993
		JP 6504558 T	26-05-1994
		MX 9102312 A	31-01-1994
		NO 931920 A	16-07-1993
		NZ 240799 A	26-01-1994
		SG 47853 A	17-04-1998
		WO 9209654 A	11-06-1994
US 5412005 A	02-05-1995	EP 0525245 A	03-02-1993
		IT 1245485 B	20-09-1994
		IT 1256693 B	12-12-1995
		IT 1263114 B	30-07-1996
		CN 1077966 A,B	03-11-1993
		IL 104942 A	10-06-1997
		AT 155161 T	15-07-1997
		AU 658180 B	06-04-1995
		AU 1650992 A	21-12-1992
		AU 658207 B	06-04-1995
		AU 2058292 A	04-02-1993
		BR 9205258 A	27-07-1993

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter ›nal Application No
PCT/EP 99/06333

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5412005 A		CA 2074649 A	02-02-1993
		CA 2084994 A	04-11-1992
		CN 1071588 A	05-05-1993
		CZ 285748 B	13-10-1999
		DE 9219021 U	27-02-1997
		DE 69220754 D	14-08-1997
		DE 69220754 T	04-12-1997
		DE 539541 T	30-01-1997
		DK 539541 T	15-09-1997
		WO 9219680 A	12-11-1992
		EP 0539541 A	05-05-1993
		ES 2103943 T	01-10-1997
		FI 925978 A	31-12-1992
		GR 3024078 T	31-10-1997
		HU 216971 B	28-10-1999
		JP 5228205 A	07-09-1993
		JP 2527523 B	28-08-1996
		JP 6502676 T	24-03-1994
		KR 9608112 B	20-06-1996
		LV 12151 A	20-10-1998
		LV 12151 B	20-12-1998
		NO 925049 A	30-12-1992
		PL 295469 A	04-05-1993
		RU 2095379 C	10-11-1997
		SK 390192 A	07-12-1994
		RU 2089151 C	10-09-1997
		US 5286770 A	15-02-1994
		AT 127034 T	15-09-1995
		DE 69204351 D	05-10-1995
		DE 69204351 T	11-04-1996
		DK 512360 T	18-09-1995
		EP 0512360 A	11-11-1992
		ES 2077280 T	16-11-1995
		GR 3017583 T	31-12-1995
		JP 5123550 A	21-05-1993
		PL 174799 B	30-09-1998
		US 5534150 A	09-07-1996
		AT 165385 T	15-05-1998

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 01 May 2000 (01.05.00)	
International application No. PCT/EP99/06333	**Applicant's or agent's file reference** PC270PR
International filing date (day/month/year) 27 August 1999 (27.08.99)	**Priority date** (day/month/year) 28 August 1998 (28.08.98)
Applicant BASTIOLI, Catia et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

27 March 2000 (27.03.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

C. Villet

Telephone No.: (41-22) 338.83.38

M.H

PATENT COOPERATION TREATY

PCT

09/786097

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.
PC270PR		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/EP 99/ 06333	27/08/1999	28/08/1998
Applicant		
MINISTERO DELL'UNIVERSITA' E DELLA RICER... et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

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   a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

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   [ ] furnished subsequently to this Authority in computer readble form.

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   [ ] the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. [ ] **Certain claims were found unsearchable** (See Box I).

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6. The figure of the **drawings** to be published with the abstract is Figure No. _____

   [ ] as suggested by the applicant.

   [ ] because the applicant failed to suggest a figure.

   [ ] because this figure better characterizes the invention.

   [X] None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/06333

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C08L67/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C08L C08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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X	US 5 444 143 A (OHTA MASAHIRO ET AL) 22 August 1995 (1995-08-22) column 1, line 8-24 column 3, line 8-14 claim 5	1-7
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-/—

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2000	09/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Von Kuzenko, M

2

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/06333

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 572 256 A (SHOWA HIGHPOLYMER) 1 December 1993 (1993-12-01) page 2, column 5-13 page 4, column 25-38	1-7, 16-20
Y	example 5	1-20
X	US 5 599 858 A (GEDON STEVEN C ET AL) 4 February 1997 (1997-02-04)	1-7, 16-20
Y	column 1, line 15-26 column 5, line 3-12 column 9, line 43 -column 10, line 15 column 12, line 32-58 claims 1,2,12	1-20
X	US 5 412 005 A (BASTIOLI CATIA ET AL) 2 May 1995 (1995-05-02) column 1, line 37-43 column 2, line 63-68 column 3, line 40; claims 1-3	1-7, 16-20

2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 99/06333

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5440008 A	08-08-1995	DE 4418643 A	01-12-1994
		JP 7228678 A	29-08-1995
US 5444143 A	22-08-1995	EP 0603889 A	29-06-1994
		FI 935791 A	26-06-1994
		JP 7133344 A	23-05-1995
		US 5512653 A	30-04-1996
WO 9743329 A	20-11-1997	US 5661193 A	26-08-1997
		EP 0898591 A	03-03-1997
EP 0572256 A	01-12-1993	JP 6041288 A	15-02-1994
		KR 129794 B	07-04-1998
		US 5310782 A	10-05-1994
US 5599858 A	04-02-1997	US 5446079 A	29-08-1995
		US 5292783 A	08-03-1994
		US 5900322 A	04-05-1999
		US 5580911 A	03-12-1996
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		AT 150058 T	15-03-1997
		AU 696544 B	10-09-1998
		AU 4557496 A	06-06-1996
		AU 664831 B	07-12-1995
		AU 9105091 A	25-06-1992
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		CN 1183426 A	03-06-1998
		CN 1183423 A	03-06-1998
		CN 1183433 A	03-06-1998
		CN 1183427 A	03-06-1998
		CN 1183428 A	03-06-1998
		CN 1183429 A	03-06-1998
		DE 69125170 D	17-04-1997
		EP 0559785 A	15-09-1993
		EP 0736557 A	09-10-1996
		EP 0950678 A	20-10-1999
		FI 932450 A	28-05-1993
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		MX 9102312 A	31-01-1994
		NO 931920 A	16-07-1993
		NZ 240799 A	26-01-1994
		SG 47853 A	17-04-1998
		WO 9209654 A	11-06-1994
US 5412005 A	02-05-1995	EP 0525245 A	03-02-1993
		IT 1245485 B	20-09-1994
		IT 1256693 B	12-12-1995
		IT 1263114 B	30-07-1996
		CN 1077966 A,B	03-11-1993
		IL 104942 A	10-06-1997
		AT 155161 T	15-07-1997
		AU 658180 B	06-04-1995
		AU 1650992 A	21-12-1992
		AU 658207 B	06-04-1995
		AU 2058292 A	04-02-1993
		BR 9205258 A	27-07-1993

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 99/06333

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5412005 A		CA 2074649 A	02-02-1993
		CA 2084994 A	04-11-1992
		CN 1071588 A	05-05-1993
		CZ 285748 B	13-10-1999
		DE 9219021 U	27-02-1997
		DE 69220754 D	14-08-1997
		DE 69220754 T	04-12-1997
		DE 539541 T	30-01-1997
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		WO 9219680 A	12-11-1992
		EP 0539541 A	05-05-1993
		ES 2103943 T	01-10-1997
		FI 925978 A	31-12-1992
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		HU 216971 B	28-10-1999
		JP 5228205 A	07-09-1993
		JP 2527523 B	28-08-1996
		JP 6502676 T	24-03-1994
		KR 9608112 B	20-06-1996
		LV 12151 A	20-10-1998
		LV 12151 B	20-12-1998
		NO 925049 A	30-12-1992
		PL 295469 A	04-05-1993
		RU 2095379 C	10-11-1997
		SK 390192 A	07-12-1994
		RU 2089151 C	10-09-1997
		US 5286770 A	15-02-1994
		AT 127034 T	15-09-1995
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		JP 5123550 A	21-05-1993
		PL 174799 B	30-09-1998
		US 5534150 A	09-07-1996
		AT 165385 T	15-05-1998

PATENT COOPERATION TREATY

09/786097 Rec'd

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

RAMBELLI, Paolo
JACOBACCI & PERANI S.P.A.
Corso Regio Parco, 27
10152 Torino
ITALIE

RICEVUTO
30.NOV 2000
RISP.

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Rule 71.1)

Date of mailing *(day/month/year)*	28.11.2000
Applicant's or agent's file reference: PC270PR	**IMPORTANT NOTIFICATION**

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP99/06333	27/08/1999	28/08/1998

Applicant
MINISTERO DELL'UNIVERSITA' E DELLA RICER... et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Connolly, M Tel.+49 89 2399-8021

Form PCT/IPEA/416 (July 1992)

PATENT COOPERATION TREATY 09/786097

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PC270PR		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP99/06333	27/08/1999	28/08/1998
International Patent Classification (IPC) or national classification and IPC		
C08L67/00		
Applicant		
MINISTERO DELL'UNIVERSITA' E DELLA RICER... et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
27/03/2000	28.11.2000
Name and mailing address of the international preliminary examining authority:	Authorized officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Von Kuzenko, M Telephone No. +49 89 2399 8605

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/06333

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:
Description, pages:

1-12 as originally filed

Claims, No.:

1-14 with telefax of 13/10/2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations
see separate sheet

cf V

1. Claim 1 on file relates to a new use of a selected class of polyester resins (obtained from bicarboxylic acids and from diols with 2-22 carbon atoms, wherein the half-sum of the carbon atoms of the acid and the diol is at least 6, or from hydroxy-acids with 7-22 carbon atoms).
   These selected polyesters have a permeability to water vapor of less than 350gx30µm/m^2 and specific biodegradability properties.
   None of the cited prior art documents discloses the use of these esters for the manufacture of articles having the permeability and biodegradability properties recited by claim 1.
   Hence the subject-matter of amended claim 1 is novel.
   Art. 33(2) PCT.
2. Aliphatic polyesters obtained from bicarboxylic acids and diols wherein the half-sum of the carbon atoms of the acid and diol is less than 6 or from hydroxy-acid with less than 7 carbon atoms have a water vapor permeability which is by far higher than the maximum limit recited by present claim 1 (see Comparative Example).
   This effect is unexpected. Therefore the subject-matter of claim 1 also meets the requirements of Art. 33(3) PCT.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/06333

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C08L67/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C08L C08G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 440 008 A (ICHIKAWA FUMIAKI ET AL) 8 August 1995 (1995-08-08) column 1, line 8-23 column 4, line 23-30 ---	1-7
X	US 5 444 143 A (OHTA MASAHIRO ET AL) 22 August 1995 (1995-08-22) column 1, line 8-24 column 3, line 8-14 claim 5 ---	1-7
A	WO 97 43329 A (EASTMAN CHEM CO) 20 November 1997 (1997-11-20) --- -/--	1-20

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2000	09/02/2000

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Von Kuzenko, M

2

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 99/06333

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 572 256 A (SHOWA HIGHPOLYMER) 1 December 1993 (1993-12-01) page 2, column 5-13 page 4, column 25-38	1-7, 16-20
Y	example 5	1-20

X	US 5 599 858 A (GEDON STEVEN C ET AL) 4 February 1997 (1997-02-04)	1-7, 16-20
Y	column 1, line 15-26 column 5, line 3-12 column 9, line 43 -column 10, line 15 column 12, line 32-58 claims 1,2,12	1-20

X	US 5 412 005 A (BASTIOLI CATIA ET AL) 2 May 1995 (1995-05-02) column 1, line 37-43 column 2, line 63-68 column 3, line 40; claims 1-3	1-7, 16-20

2

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 99/06333

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5440008 A	08-08-1995	DE 4418643 A	01-12-1994
		JP 7228678 A	29-08-1995
US 5444143 A	22-08-1995	EP 0603889 A	29-06-1994
		FI 935791 A	26-06-1994
		JP 7133344 A	23-05-1995
		US 5512653 A	30-04-1996
WO 9743329 A	20-11-1997	US 5661193 A	26-08-1997
		EP 0898591 A	03-03-1997
EP 0572256 A	01-12-1993	JP 6041288 A	15-02-1994
		KR 129794 B	07-04-1998
		US 5310782 A	10-05-1994
US 5599858 A	04-02-1997	US 5446079 A	29-08-1995
		US 5292783 A	08-03-1994
		US 5900322 A	04-05-1999
		US 5580911 A	03-12-1996
		US 5559171 A	24-09-1996
		AT 150058 T	15-03-1997
		AU 696544 B	10-09-1998
		AU 4557496 A	06-06-1996
		AU 664831 B	07-12-1995
		AU 9105091 A	25-06-1992
		BR 9107138 A	05-04-1994
		CA 2095536 A	31-05-1992
		CN 1062740 A	15-07-1992
		CN 1183426 A	03-06-1998
		CN 1183423 A	03-06-1998
		CN 1183433 A	03-06-1998
		CN 1183427 A	03-06-1998
		CN 1183428 A	03-06-1998
		CN 1183429 A	03-06-1998
		DE 69125170 D	17-04-1997
		EP 0559785 A	15-09-1993
		EP 0736557 A	09-10-1996
		EP 0950678 A	20-10-1999
		FI 932450 A	28-05-1993
		JP 6504558 T	26-05-1994
		MX 9102312 A	31-01-1994
		NO 931920 A	16-07-1993
		NZ 240799 A	26-01-1994
		SG 47853 A	17-04-1998
		WO 9209654 A	11-06-1994
US 5412005 A	02-05-1995	EP 0525245 A	03-02-1993
		IT 1245485 B	20-09-1994
		IT 1256693 B	12-12-1995
		IT 1263114 B	30-07-1996
		CN 1077966 A,B	03-11-1993
		IL 104942 A	10-06-1997
		AT 155161 T	15-07-1997
		AU 658180 B	06-04-1995
		AU 1650992 A	21-12-1992
		AU 658207 B	06-04-1995
		AU 2058292 A	04-02-1993
		BR 9205258 A	27-07-1993

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/EP 99/06333

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5412005 A		CA 2074649 A	02-02-1993
		CA 2084994 A	04-11-1992
		CN 1071588 A	05-05-1993
		CZ 285748 B	13-10-1999
		DE 9219021 U	27-02-1997
		DE 69220754 D	14-08-1997
		DE 69220754 T	04-12-1997
		DE 539541 T	30-01-1997
		DK 539541 T	15-09-1997
		WO 9219680 A	12-11-1992
		EP 0539541 A	05-05-1993
		ES 2103943 T	01-10-1997
		FI 925978 A	31-12-1992
		GR 3024078 T	31-10-1997
		HU 216971 B	28-10-1999
		JP 5228205 A	07-09-1993
		JP 2527523 B	28-08-1996
		JP 6502676 T	24-03-1994
		KR 9608112 B	20-06-1996
		LV 12151 A	20-10-1998
		LV 12151 B	20-12-1998
		NO 925049 A	30-12-1992
		PL 295469 A	04-05-1993
		RU 2095379 C	10-11-1997
		SK 390192 A	07-12-1994
		RU 2089151 C	10-09-1997
		US 5286770 A	15-02-1994
		AT 127034 T	15-09-1995
		DE 69204351 D	05-10-1995
		DE 69204351 T	11-04-1996
		DK 512360 T	18-09-1995
		EP 0512360 A	11-11-1992
		ES 2077280 T	16-11-1995
		GR 3017583 T	31-12-1995
		JP 5123550 A	21-05-1993
		PL 174799 B	30-09-1998
		US 5534150 A	09-07-1996
		AT 165385 T	15-05-1998

PATENT COOPERATION TREATY 09/786097

From the INTERNATIONAL BUREAU

PCT

INFORMATION CONCERNING ELECTED OFFICES NOTIFIED OF THEIR ELECTION

(PCT Rule 61.3)

To:

RAMBELLI, Paolo
Jacobacci & Perani S.p.A.
Corso Regio Parco, 27
I-10152 Torino
ITALIE

RICEVUTO
15. MAG 2000
RISP.....

Date of mailing (day/month/year) 01 May 2000 (01.05.00)	
Applicant's or agent's file reference PC270PR	**IMPORTANT INFORMATION**

International application No.	**International filing date** (day/month/year)	**Priority date** (day/month/year)
PCT/EP99/06333	27 August 1999 (27.08.99)	28 August 1998 (28.08.98)

Applicant
MINISTERO DELL'UNIVERSITA'E DELLA RICERCA SCIENTIFICA E TECNOLOGICA et al

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

   AP :GH,GM,KE,LS,MW,SD,SL,SZ,UG,ZW
   EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE
   National :AU,BG,BR,CA,CN,CZ,DE,IL,JP,KP,KR,MN,NO,NZ,PL,RO,RU,SE,SK,US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

   EA :AM,AZ,BY,KG,KZ,MD,RU,TJ,TM
   OA :BF,BJ,CF,CG,CI,CM,GA,GN,GW,ML,MR,NE,SN,TD,TG
   National :AE,AL,AM,AT,AZ,BA,BB,BY,CH,CR,CU,DK,DM,EE,ES,FI,GB,GD,GE,GH,GM,
   HR,HU,ID,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MW,MX,PT,SD,SG,SI,
   SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZA,ZW

3. The applicant is reminded that he must enter the "national phase" **before the expiration of 30 months from the priority date** before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing , if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

   Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

   The entry into the European regional phase is postponed **until 31 months from the priority date** for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:
C. Villet

Telephone No. (41-22) 338.83.38

PATENT COOPERATION TREATY 09/786097

From the INTERNATIONAL BUREAU

PCT

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

To:
RAMBELLI, Paolo
Jacobacci & Perani S.p.A.
Corso Regio Parco, 27
I-10152 Torino
ITALIE

RICEVUTO
17. MAR 2000
RISP.....

Date of mailing (day/month/year) 09 March 2000 (09.03.00)	
Applicant's or agent's file reference PC270PR	**IMPORTANT NOTICE**
International application No. PCT/EP99/06333	**International filing date** (day/month/year) 27 August 1999 (27.08.99)
Priority date (day/month/year) 28 August 1998 (28.08.98)	
Applicant MINISTERO DELL'UNIVERSITA'E DELLA RICERCA SCIENTIFICA E TECNOLOGICA et al	

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
   AU,CN,EP,JP,KP,KR,US

   In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
   AE,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,CA,CH,CR,CU,CZ,DE,DK,DM,EA,EE,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MD,MG,MK,MN,MW,MX,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,UA,UG,UZ,VN,YU,ZA,ZW
   The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on
   09 March 2000 (09.03.00) under No. WO 00/12627

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, **a demand for international preliminary examination** must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the **national phase**, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer
J. Zahra

Telephone No. (41-22) 338.83.38

Continuation of Form PCT/IB/308

NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES

Date of mailing (day/month/year)	IMPORTANT NOTICE
09 March 2000 (09.03.00)	
Applicant's or agent's file reference	**International application No.**
PC270PR	PCT/EP99/06333

The applicant is hereby notified that, at the time of establishment of this Notice, the time limit under Rule 46.1 for making amendments under Article 19 has not yet expired and the International Bureau had received neither such amendments nor a declaration that the applicant does not wish to make amendments.

09/786097

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

PCT/EP 99 / 06333
International Application No.

27 AUG 1999 (27. 08. 1999)
International Filing Date

EUROPEAN PATENT OFFICE
PCT INTERNATIONAL APPLICATION
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference
(if desired) (12 characters maximum) PC270PR

Box No. I TITLE OF INVENTION

'Use of polyester resins for the production of articles having good properties as barriers to water vapour'

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

MINISTERO DELL'UNIVERSITA' E DELLA RICERCA SCIENTIFICA
E TECNOLOGICA
Piazza Kennedy 20
I-00144 ROMA
IT

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

BASTIOLI, Catia
Via della Noce 63
I-28100 NOVARA
IT

This person is:
☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is,country)* of nationality: IT

State *(that is, country)* of residence: IT

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

RAMBELLI, Paolo [IT]; JACOBACCI, Filippo [IT]; JACOBACCI, Guido [IT]; SACONNEY, Piero [IT]; BOSOTTI, Luciano [IT]; QUINTERNO, Giuseppe [IT]; GERBINO, Angelo [IT]; SERRA, Francesco [IT]; FIORAVANTI, Corrado [IT];
JACOBACCI & PERANI S.p.A., Corso Regio Parco 27,
I-10152 TORINO (Italy)

Telephone No.
(39) (011) 2440311

Facsimile No.
(39) (011) 286300 / 286676

Teleprinter No.

☐ **Adress for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Continuation of Box No. III FURTHER APPLICANTS AND/OR (FURTHER) INVENTORS

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

FOA', Marco
Via Magnani Ricotti 19
I-28100 NOVARA
IT

This person is:
☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

CELLA, Giandomenico
Via Minghetti 1
I-28100 NOVARA
IT

This person is:
☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

FLORIDI, Giovanni
Viale Zeffirino Faina 42
I-06100 PERUGIA
IT

This person is:
☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

FARACHI, Fernanda
Via Oberdan 11
I-72027 SAN PIETRO VERNOTICO (Brindisi)
IT

This person is:
☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

☒ Further applicants and/or (further) inventors are indicated on another continuation sheet.

Sheet No. 3

Continuation of Box No. III FURTHER APPLICANTS AND/OR (FURTHER) INVENTORS

If none of the following sub-boxes is used, this sheet should not be included in the request.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

MILIZIA, Tiziana
Via Tuoro Cappuccini 69
I-83100 AVELLINO
IT

This person is:

☐ applicant only
☒ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☒ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:

☐ applicant only
☐ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:

☐ applicant only
☐ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)*

This person is:

☐ applicant only
☐ applicant and inventor
☐ inventor only *(If this check-box is marked, do not fill in below.)*

State *(that is, country)* of nationality:

State *(that is, country)* of residence:

This person is applicant for the purposes of: ☐ all designated States ☐ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on another continuation sheet.

See Notes to the request form

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- [X] **AP** **ARIPO Patent:** **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SL** Sierra Leone, **SZ** Swaziland, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- [X] **EA** **Eurasian Patent:** **AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- [X] **EP** **European Patent:** **AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **CY** Cyprus, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- [X] **OA** **OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **GW** Guinea-Bissau, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- [X] **AE** United Arab Emirates
- [X] **AL** Albania
- [X] **AM** Armenia
- [X] **AT** Austria
- [X] **AU** Australia
- [X] **AZ** Azerbaijan
- [X] **BA** Bosnia and Herzegovina
- [X] **BB** Barbados
- [X] **BG** Bulgaria
- [X] **BR** Brazil
- [X] **BY** Belarus
- [X] **CA** Canada
- [X] **CH and LI** Switzerland and Liechtenstein
- [X] **CN** China
- [X] **CU** Cuba
- [X] **CZ** Czech Republic
- [X] **DE** Germany
- [X] **DK** Denmark
- [X] **EE** Estonia
- [X] **ES** Spain
- [X] **FI** Finland
- [X] **GB** United Kingdom
- [X] **GD** Grenada
- [X] **GE** Georgia
- [X] **GH** Ghana
- [X] **GM** Gambia
- [X] **HR** Croatia
- [X] **HU** Hungary
- [X] **ID** Indonesia
- [X] **IL** Israel
- [X] **IN** India
- [X] **IS** Iceland
- [X] **JP** Japan
- [X] **KE** Kenya
- [X] **KG** Kyrgyzstan
- [X] **KP** Democratic People's Republic of Korea
- [X] **KR** Republic of Korea
- [X] **KZ** Kazakhstan
- [X] **LC** Saint Lucia
- [X] **LK** Sri Lanka
- [X] **LR** Liberia
- [X] **LS** Lesotho
- [X] **LT** Lithuania
- [X] **LU** Luxembourg
- [X] **LV** Latvia
- [X] **MD** Republic of Moldova
- [X] **MG** Madagascar
- [X] **MK** The former Yugoslav Republic of Macedonia
- [X] **MN** Mongolia
- [X] **MW** Malawi
- [X] **MX** Mexico
- [X] **NO** Norway
- [X] **NZ** New Zealand
- [X] **PL** Poland
- [X] **PT** Portugal
- [X] **RO** Romania
- [X] **RU** Russian Federation
- [X] **SD** Sudan
- [X] **SE** Sweden
- [X] **SG** Singapore
- [X] **SI** Slovenia
- [X] **SK** Slovakia
- [X] **SL** Sierra Leone
- [X] **TJ** Tajikistan
- [X] **TM** Turkmenistan
- [X] **TR** Turkey
- [X] **TT** Trinidad and Tobago
- [X] **UA** Ukraine
- [X] **UG** Uganda
- [X] **US** United States of America
- [X] **UZ** Uzbekistan
- [X] **VN** Viet Nam
- [X] **YU** Yugoslavia
- [X] **ZA** South Africa
- [X] **ZW** Zimbabwe

Check-boxes reserved for designating States which have become party to the PCT after issuance of this sheet:

- [X] CR Costa Rica
- [X] DM Dominica

Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

See Notes to the request form

Box No. VI PRIORITY CLAIM ☐ Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is: national application: country	regional application:* regional Office	international application: receiving Office
item (1) (28.08.1998) 28 AUGUST 1998	TO98A000729	IT~~ALY~~ ☒		
item (2) (26.10.1998) 26 OCTOBER 1998	TO98A000907	IT~~ALY~~ ☒		
item (3)				

☐ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) *(only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office)* identified above as item(s): _____

* *Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.*

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):*

ISA / EP

Request to use results of earlier search; reference to that search *(if an earlier search has been carried out by or requested from the International Searching Authority):*

Date *(day/month/year)* Number Country *(or regional Office)*

Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following **number of sheets**:

request	: 5
description (excluding sequence listing part)	: 12
claims	: 5
abstract	: 1
drawings	:
sequence listing part of description	:
Total number of sheets	: 23

This international application is **accompanied by** the item(s) marked below:

1. ☒ fee calculation sheet ~~(follows)~~
2. ☒ separate signed power of attorney ~~(follows)~~
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☒ priority document(s) identified in Box No. VI as item(s): ~~(1) (2) TO FOLLOW~~
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☐ other *(specify)*:

Figure of the drawings which should accompany the abstract:

Language of filing of the international application: English

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

Angelo Gerbino

GERBINO, Angelo

For receiving Office use only

1. Date of actual receipt of the purported international application: (27. 08. 1999) 27 AUG 1999	2. Drawings: ☐ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority (if two or more are competent): ISA /	6. ☐ Transmittal of search copy delayed until search fee is paid.

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ _____

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:
The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only

Identification of IPEA	Date of receipt of DEMAND

Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION

Applicant's or agent's file reference: PC270PR

International application No.	International filing date *(day/month/year)*	(Earliest) Priority date *(day/month/year)*
PCT/EP99/06333	27 August 1999 (27.08.1999)	28 August 1998 (28.08.1998)

Title of invention

"Use of polyester resins for the production of articles having good properties as barriers to water vapour"

Box No. II APPLICANT(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

MINISTERO DELL'UNIVERSITA' E DELLA RICERCA
SCIENTIFICA E TECNOLOGICA
Piazza Kennedy 20
I-00144 ROMA (Italy)

Telephone No.:

Facsimile No.:

Teleprinter No.:

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

BASTIOLI, Catia
Via della Noce 63
I-28100 NOVARA (Italy)

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

FOA', Marco
Via Magnani Ricotti 19
I-28100 NOVARA (Italy)

State *(that is, country)* of nationality: IT

State *(that is, country)* of residence: IT

[X] Further applicants are indicated on a continuation sheet.

See Notes to the demand form

International application No.
PCT/EP99/06333

Continuation of Box No. II APPLICANT(S)

If none of the following sub-boxes is used, this sheet should not be included in the demand.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

CELLA, Giandomenico
Via Minghetti 1
I-28100 NOVARA (Italy)

State *(that is, country)* of nationality:	State *(that is, country)* of residence:
IT	IT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

FLORIDI, Giovanni
Viale Zeffirino Faina 42
I-06100 PERUGIA (Italy)

State *(that is, country)* of nationality:	State *(that is, country)* of residence:
IT	IT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

FARACHI, Fernanda
Via Oberdan 11
I-72027 SAN PIETRO VERNOTICO (Brindisi)
Italy

State *(that is, country)* of nationality:	State *(that is, country)* of residence:
IT	IT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

MILIZIA, Tiziana
Via Tuoro Cappuccini 69
I-83100 AVELLINO (Italy)

State *(that is, country)* of nationality:	State *(that is, country)* of residence:
IT	IT

☐ Further applicants are indicated on another continuation sheet.

International application No.
PCT/EP99/06333

Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The following person is [x] agent [ ] common representative

and [x] has been appointed earlier and represents the applicant(s) also for international preliminary examination.

[ ] is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.

[ ] is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*

RAMBELLI, Paolo (IT)

c/o JACOBACCI & PERANI S.p.A.
Corso Regio Parco 27
I-10152 TORINO (Italy)

Telephone No.: +39 +011 2440311

Facsimile No.: +39 +011 286300 / 286676

Teleprinter No.:

[ ] **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special addr ess to which correspondence should be sent.

Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION

Statement concerning amendments:*

1. The applicant wishes the international preliminary examination **to start on the basis of:**

[x] the international application as originally filed

the description [ ] as originally filed
[ ] as amended under Article 34

the claims [ ] as originally filed
[ ] as amended under Article 19 (together with any accompanying statement)
[ ] as amended under Article 34

the drawings [ ] as originally filed
[ ] as amended under Article 34

2. [ ] The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.

3. [ ] The applicant wishes the start of the international preliminary examination **to be postponed** until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: ENGLISH

[x] which is the language in which the international application was filed.

[ ] which is the language of a translation furnished for the purposes of international search.

[ ] which is the language of publication of the international application.

[ ] which is the language of the translation (to be) furnished for the purposes of international preliminary examination.

Box No. V ELECTION OF STATES

The applicant hereby **elects all eligible States** *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes **not to elect:**

See Notes to the demand form

Sheet No. 4

International application No.
PCT/EP99/06333

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:			For International Preliminary Examining Authority use only: received	not received
1. translation of international application	:	sheets	☐	☐
2. amendments under Article 34	:	sheets	☐	☐
3. copy (or, where required, translation) of amendments under Article 19	:	sheets	☐	☐
4. copy (or, where required, translation) of statement under Article 19	:	sheets	☐	☐
5. letter	:	sheets	☐	☐
6. other *(specify)*	:	sheets	☐	☐

The demand is also accompanied by the item(s) marked below:

1. [x] fee calculation sheet
2. [ ] separate signed power of attorney
3. [ ] copy of general power of attorney; reference number, if any:
4. [ ] statement explaining lack of signature
5. [ ] nucleotide and or amino acid sequence listing in computer readable form
6. [ ] other *(specify)*:

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).

RAIMBELLI, Paolo

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:
2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):
3. [ ] The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply. [ ] The applicant has been informed accordingly.
4. [ ] The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.
5. [ ] Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

09/786097

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

15

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PC270PR		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP99/06333	27/08/1999	28/08/1998
International Patent Classification (IPC) or national classification and IPC		
C08L67/00		
Applicant		
MINISTERO DELL'UNIVERSITA' E DELLA RICER... et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
27/03/2000	28.11.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Von Kuzenko, M Telephone No. +49 89 2399 8605

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/06333

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:
Description, pages:

1-12 as originally filed

Claims, No.:

1-14 with telefax of 13/10/2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations
see separate sheet

cf V

1. Claim 1 on file relates to a new use of a selected class of polyester resins (obtained from bicarboxylic acids and from diols with 2-22 carbon atoms, wherein the half-sum of the carbon atoms of the acid and the diol is at least 6, or from hydroxy-acids with 7-22 carbon atoms).
   These selected polyesters have a permeability to water vapor of less than 350gx30µm/m^2 and specific biodegradability properties.
   None of the cited prior art documents discloses the use of these esters for the manufacture of articles having the permeability and biodegradability properties recited by claim 1.
   Hence the subject-matter of amended claim 1 is novel.
   Art. 33(2) PCT.
2. Aliphatic polyesters obtained from bicarboxylic acids and diols wherein the half-sum of the carbon atoms of the acid and diol is less than 6 or from hydroxy-acid with less than 7 carbon atoms have a water vapor permeability which is by far higher than the maximum limit recited by present claim 1 (see Comparative Example).
   This effect is unexpected. Therefore the subject-matter of claim 1 also meets the requirements of Art. 33(3) PCT.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

09786.6bm

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
PC270PR		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP99/06333	27/08/1999	28/08/1998
International Patent Classification (IPC) or national classification and IPC		
C08L67/00		
Applicant		
MINISTERO DELL'UNIVERSITA' E DELLA RICER... et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 4 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
27/03/2000	28.11.2000
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Von Kuzenko, M Telephone No. +49 89 2399 8605

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/06333

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).)*:
Description, pages:

1-12 as originally filed

Claims, No.:

1-14 with telefax of 13/10/2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-14
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-14
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-14
	No:	Claims	

2. Citations and explanations
see separate sheet

cf V

1. Claim 1 on file relates to a new use of a selected class of polyester resins (obtained from bicarboxylic acids and from diols with 2-22 carbon atoms, wherein the half-sum of the carbon atoms of the acid and the diol is at least 6, or from hydroxy-acids with 7-22 carbon atoms).
   These selected polyesters have a permeability to water vapor of less than $350gx30\mu m/m^2$ and specific biodegradability properties.
   None of the cited prior art documents discloses the use of these esters for the manufacture of articles having the permeability and biodegradability properties recited by claim 1.
   Hence the subject-matter of amended claim 1 is novel.
   Art. 33(2) PCT.
2. Aliphatic polyesters obtained from bicarboxylic acids and diols wherein the half-sum of the carbon atoms of the acid and diol is less than 6 or from hydroxy-acid with less than 7 carbon atoms have a water vapor permeability which is by far higher than the maximum limit recited by present claim 1 (see Comparative Example).
   This effect is unexpected. Therefore the subject-matter of claim 1 also meets the requirements of Art. 33(3) PCT.

CLAIMS

1. Use of compositions comprising, in quantities sufficient to ensure the required performance, polyester resins with mean numeral molecular weights greater than 10000 formed by recurring units X = $[O-(CH_2)_n-OCO-(CH_2)_m-CO]$ and/or
Y = $[O-(CH_2)_k-CO]$, where the half-sum of n + m is equal to or greater than 6 and k is a number equal to or greater than 6, or by copolymers comprising units and/or sequences having the formula $x_i[O-(CH_2)_{ni}-OCO-(CH_2)_{mi}-CO]$; y_j $[O-(CH_2)_{kj}-CO]$ where: i,j = 1-5; n_i = 2-22; m_i = 0-20; k_j = 1-21;

$\sum_{i=1}^{5} x_i + \sum_{j=1}^{5} y_j = 1$ and x_i and y_j vary between 0 and 1 and are molar fractions of the various units such that

$$\sum_{i=1}^{5} x_i \cdot \left(\frac{n_i + m_i}{2}\right) + \sum_{j=1}^{5} y_j \cdot k_j \geq 6$$

or by recurring units Z= $[O-(CH_2)_a-OCO-(CH_2)b-CO]$ where a=2-3, b=7-11,
present in sufficient quantity to ensure good barrier properties and biodegradability of the resins for the manufacture of articles having a permeability to water vapour of less than 350 gx30μm/m^2 per day at 38°C and 90% RH, said articles showing decomposition in composting conditions on 30μm film of less than 10% in 14 days and more than 90% in six months.

2. Use according to Claim 1, in which the polyester resins have a melting point of between 60 and 110°C.

3. Use according to Claim 1, in which the polyester resin

is produced by polycondensation of bicarboxylic aliphatic acids with from 2 to 22 carbon atoms and of diols with from 2 to 22 carbon atoms, selected in a manner such that the half-sum of the number of carbon atoms relating to the acid and to the diol is greater than 6, or by polycondensation of hydroxy-acids, or by ring-opening of corresponding lactones or lactides having from 7 to 22 carbon atoms.

4. Use according to Claim 1, in which the diacids and the dialcohols are obtained from renewable sources.

5. Use according to any one of the preceding claims, in which the polyester resin is selected from polyethylene sebacate, polybutandiol sebacate, polyhexandiol azelate, polyhexandiol sebacate, polynonandiol azelate, polynonandiol sebacate, polyoctandiol azelate, polyoctandiol brassilate, polydecandiol sebacate and polydecandiol brassilate.

6. Use according to any one of the preceding claims, in which the polyester resin has an intrinsic viscosity greater than 0.7 dl/g in chloroform at 25°C.

7. Use according to any one of the preceding claims, in which the polyester resin is subjected to an upgrading process.

8. Use according to any one of the preceding claims, in which the polyester resin is a component of a blend of unmodified or modified polysaccharides.

9. Use according to any one of the preceding claims, in

which the polyester resin contains mineral or vegetable fillers and/or additives selected from lubricants, plasticizers, colourings, flavourings, perfumes, flame-proofing agents, stabilizers with regard to hydrolysis and to thermal degradation, and antioxidants.

10. Use according to any one of the preceding claims, in which the mean numeral molecular weight of the polyester resin is between 45000 and 70000.

11. Use according to Claim 1 wherein said articles are selected from:

- coatings which are produced by extrusion-coating, with water-vapour barrier properties, and which are usable for the packaging of fresh milk and dairy products, of meat, and of foods having high water content,
- multi-layer laminates with layers of paper, plastics material or paper/plastics material, aluminium and metallized films,
- films as such and multi-layer films with other polymer materials,
- sacks for organic refuse and for grass cuttings with periods of use longer than 1 week,
- single-layer and multi-layer food packaging comprising containers for milk, yoghurt, cheeses, meat and beverages, in which the layer in contact with the food or beverage is formed by the aliphatic polyester,
- composites with gelatinized or destructured starch, and/or complexed starch or natural starch as a filler,
- mono-directional and bi-directional films,
- semi-expanded and expanded products produced by

physical and/or chemical means, by extrusion, injection, or agglomeration of pre-expanded particles,

- expanded sheet and expanded containers for foods, for drugs, and for fast food,
- fibres, fabrics and non-woven fabrics in the hygiene, sanitary and clothing fields,
- composites with mineral and vegetable fillers,
- thermoformed sheets for the food or fast-food packaging fields,
- bottles for the food, cosmetics and pharmaceutical fields,
- fishing nets,
- containers for fruit and vegetables,
- extruded sections usable in the fast-food field and irrigation pipes in the agricultural field.

12. Use of polyester resins as defined in Claim 1 in blends with other biodegradable polymers having a permeability to water vapour greater than 300 gx30μm/m² per day at 38°C and 90% RH.

13. Use of polyester resins as defined in Claim 1 in blends with polylactic acid.

14. Use of polyester resins as defined in Claim 1 in blends with other non-biodegradable polymers, the said polymers having a permeability to water vapour of less than 300 gx30μm/m² per day at 38°C and 90% RH.

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(54) Title: USE OF POLYESTER RESINS FOR THE PRODUCTION OF ARTICLES HAVING GOOD PROPERTIES AS BARRIERS TO WATER VAPOUR

(57) Abstract

Polyester resins formed by recurring units X = $[O–(CH_2)_n–OCO–(CH_2)_m–CO]$ and/or Y = $[O–(CH_2)_k–CO]$, where the half–sum of n + m is equal to or greater than 6 and k is a number equal to or greater than 6, or by copolymers comprising units and/or sequences having the formula $x_i[O–(CH_2)_{ni}–OCO–(CH_2)_{mi}–CO]$; y_j $[O–(CH_2)_{kj}–CO]$ where: i,j = 1–5; n_i = 2–22; m_i = 0–20; k_j = 1=21; (Formula (1)) and x_i and y_j

$$\sum_{i=1}^{5} x_i + \sum_{j=1}^{5} y_j = 1 \qquad (1)$$

$$\sum_{i=1}^{5} x_i \cdot \left(\frac{n_i + m_i}{2}\right) + \sum_{j=1}^{5} y_j \cdot k_j \geq 6 \qquad (2)$$

vary between 0 and 1 and are molar fractions of the various units such that (Formula (2)), are used for the preparation of products in which a permeability to water vapour of less than 350 gx30μm/m^2 per day, measured at 38 °C and 90 % RH and good biodegradability are required.

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Use of polyester resins for the production of articles having good properties as barriers to water vapour

The present invention relates to the use of biodegradable polyester resins in the production of formed articles having good properties as barriers to water vapour.

The water-vapour barrier properties of biodegradable polymers developed in recent years are quite poor.

For example, polyesters such as polyhydroxybutyrate-valerate, polylactic acid, polyglycolic acid, polycaprolactone, polybutylene succinate, copolymers such as polybutylene adipate-co-terephthalate, polyester-amides such as polybutylene adipate-co-caprolactam, polyvinyl alcohol, ethylene-vinyl alcohol copolymers, polyesters-urethanes, and esters of cellulose and regenerated cellulose have permeabilities to water vapour greater than 300 gx30μm/m^2 per day at 38°C and 90% relative humidity (RH) (Lyssy method).

The poor barrier properties can be related to the fact that these polymers have good biodegradability which, in order for the bacterial action to be performed advantageously, means that the polymer should be wettable and hence contains polar groups in its structure with a consequent reduction in its water-vapour barrier properties since the polar groups increase the solubility of water in the polymer and hence its permeability to water vapour.

High permeability to water vapour considerably limits the fields of use of biodegradable polymers such as the above-mentioned aliphatic polyesters or copolyesters, particularly where good biodegradability and low permeability to water would be very desirable.

Fields of use in which there is a particular need for biodegradable materials having good water-vapour barrier properties are, for example, the hygiene field (so-called non-breathable nappies, that is to say, nappies with a low transpiration value, similar to the nappies which are in use with a backsheet of polyethylene and non-woven polypropylene fabric), multi-layer and non-multi-layer food packaging based on laminated milk cartons, mulching of soils where the evaporation of water through materials is to be as limited as possible, containers for soil for growing plants in greenhouses, sacks for collecting grass cuttings which require reduced biodegradation rates by virtue of a lower wettability of the biodegradable film of which the sack is made, non-woven fabric which can provide a dry feel for nappies, fishing nets which must not undergo significant alterations due to water during the period of use, expanded products for packaging which requires moisture protection whilst remaining biodegradable, irrigation pipes for agriculture, products in contact with liquid foodstuffs, such as fast-food cups, plates and drinking straws, expanded trays for foodstuffs, blister packs for pharmaceutical products, nursery plant-pots through which moisture must not be able to pass and which must have a degradation process which does not interfere with the growth of the plants, hygiene products such as colostomy bags and the like, or blood containers, fibres for disposable products which can withstand water and a few washings, for disposable hosiery and garments, etc.

It has now been found, unexpectedly - in view of the outstanding permeability of aliphatic polyesters such as polybutylene adipate, polybutylene succinate, polyhexamethylene adipate and polybutylene adipate-co-terephthalate to water vapour - that the polyester resins defined below have good water-vapour barrier properties and,

at the same time, are sufficiently biodegradable in normal composting conditions and are therefore usable in applications in which such properties are required.

The polyester resins usable in the applications of the invention are formed by recurring units X = $[O-(CH_2)_n-OCO-(CH_2)_m-CO]$ and/or Y = $[O-(CH_2)_k-CO]$, where the half-sum of n + m is equal to or greater than 6 and k is a number equal to or greater than 6, or by copolymers comprising units and/or sequences having the formula $x_i[O-(CH_2)_{ni}-OCO-(CH_2)_{mi}CO]$; y_j $[O-(CH_2)_{kj}-CO]$ where:
$i,j = 1-5$; $n_i = 2-22$; $m_i = 0-20$; $k_j = 1=21$;

$\sum_{i=1}^{5} x_i + \sum_{j=1}^{5} y_j = 1$ and x_i and y_j vary between 0 and 1 and are molar fractions of the various units such that

$\sum_{i=1}^{5} x_i \cdot \left(\frac{n_i + m_i}{2}\right) + \sum_{j=1}^{5} y_j \cdot k_j \geq 6$, or by recurring units

$Z= [O-(CH_2)_a-OCO-(CH_2)_b-CO]$ where a=2-3 and b=7-11, present in sufficient quantity to ensure good barrier properties and biodegradability of the resins in the production of products in which a permeability to water vapour of less than 350 gx30μm/m^2 per day at 38°C and 90% RH and biodegradability in composting or burial conditions are required.

The products which can be produced from the polyesters as defined above can ensure permeability to water vapour of less than 350, more particularly less than 300, gx30μm/m^2 per day at 38°C and 90% RH.

The biodegradability of the products during composting or burial is sufficient to bring about their decomposition within the required periods of time.

More particularly, in the case of the products produced from the preferred polyester resins, the biodegradability is less than 30% in one month and more than 60% in six months, in accordance with DIN 54900, part II, or decomposition on 30µm film of less than 10% in 14 days and more than 90% in 6 months, in accordance with the method described in "Journal of Environmental Polymer Degradation", Vol. 4, No. 1, 1996, p. 55-63, or in accordance with the burial test described in "Biodegradable Plastics, Practices and Test Methods" ASTM Subsection D-20.96.1 of Environmental Degradable Plastics, Version 4.0 Dec. 6 1990.

The polyester resins usable according to the invention have a mean numeral molecular weight greater than 10000 and a melting point (acceptable for industrial applications) of between 60 and 110°C.

Polyester resins with a mean numeral molecular weight of between 45000 and 70000 have been found particularly advantageous for use according to the invention.

There is not the slightest reference in the literature either to the barrier properties, particularly to water vapour, of the polyester resins falling within the general formula given above, or to their good biodegradability by decomposition.

The use of the above-mentioned polyester resins in applications which require a low permeability to water vapour (below the value indicated above) combined with a biodegradability during composting compatible with the standards in use is novel and constitutes the subject of the present invention.

Examples of applications in which the polyester resins according to the invention are particularly useful are:

- coatings produced by extrusion-coating with good water-barrier properties, particularly for the packaging of fresh milk and diary products, of meat, and of foods with high water content,
- multi-layer laminates with layers of paper, plastics material or paper/plastics material, aluminium and metallized films in general,
- films as such, and multi-layer films with other polymer materials,
- sacks for organic refuse and for grass cuttings with periods of use longer than 1 week,
- single-layer and multi-layer food packaging, particularly containers for milk, yoghurt, cheeses, meat and beverages, in which the layer in contact with the food or beverage is formed by the polyester,
- composites with gelatinized starch, destructured starch, native starch in the form of a filler, or complexed starch,
- mono-directional or bi-directional films,
- semi-expanded and expanded products produced by physical and/or chemical means, by extrusion, injection, or agglomeration of pre-expanded particles, from materials constituted by the polyester as such, from blends, or from filled materials,
- expanded sheet and expanded containers for foods, (fruit, vegetables, meat, cheeses) for drugs, and for fast-food,
- fibres, fabrics and non-woven fabrics in the hygiene, sanitary and clothing fields,
- outer non-woven fabric and/or film, front tapes for increasing the thickness of the backsheet in critical points, and adhesive strips, for the production of nappies,
- composites with mineral and vegetable fillers with various form ratios,

- extruded or thermoformed sheets and profiles in the field of food and fast-food packaging (drinking straws, cups, trays, etc.),
- bottles for the food, cosmetics and pharmaceutical fields,
- fishing nets,
- containers for fruit and vegetables,
- irrigation pipes in the agricultural field,
- products produced from blends with other biodegradable polymers (for example, polybutylene succinate, polycaprolactone, polyhydroxybutyrate-co-valerate, polyesters-amides, aliphatic-aromatic polyesters), for correcting the biodegradation rate, the processability, and/or the permeability to water of these latter polymers and the superficial properties such as migration phenomena of low molecular weight molecules,
- products produced from blends with non-biodegradable polymers.

Polyesters falling within the general formula given above can be produced by the polycondensation, in accordance with known methods, of a bicarboxylic aliphatic acid with 2-22 carbon atoms with a diol with 2-22 carbon atoms, selected in a manner such that the half-sum of the carbon atoms relating to the acid and to the diol is equal to or, preferably greater than 6, more preferably equal to 7, or by polycondensation of hydroxy-acids with 7-22, preferably 8-22 carbon atoms, or by ring-opening of the corresponding lactones or lactides; or by polycondensation of ethylen glycol with azelaic and sebacic acid.

Aliphatic-aromatic copolyesters, aliphatic-polyamide copolyesters, aliphatic-ether copolyesters, aliphatic-urea copolyesters or linear or branched urethanes in which the fraction of the aliphatic polyesters of the copolymers have the structure given above, and also blends of these

polyester resins with unmodified or modified polysaccharides, with water-vapour barrier properties of the type defined above, also fall within the scope of the invention.

Examples of bicarboxylic acids usable are succinic, adipic, pimelic, suberic, azelaic, sebacic, brassilic, undecandioic and dodecandioic acids, and dimeric acids; examples of hydroxy-acids which may be used are glycolic, hydroxybutyric, hydroxypropionic, hydroxycaproic, hydroxyvaleric, 7-hyroxyheptanoic, 8-hydroxyoctanoic, 9-hydroxynonoic, 10-hydroxydecanoic and 13-hydroxy-tridecancarboxylic acids.

Examples of diols which may be used are 1,2-ethandiol, 1,4-butandiol, 1,6-hexandiol, 1,7-heptandiol, 1,8-octandiol, 1,9-nonandiol, 1,10-decandiol, 1,12-dodecandiol, 1,4-cyclohexandimethylol and 1,4-cyclohexandiol.

Diacids and dialcohols which come from renewable sources and which can be produced from fatty acids such as oleic and ricinoleic acids are preferred.

When the diol has less than 7 carbon atoms, the acid has a number of carbon atoms such that the half-sum of the carbon atoms of the diol and of the acid is equal to or greater than 6, more preferably equal or higher than 7. The same criterion applies when the bicarboxylic acid has less than 7 carbon atoms.

The polycondensation is performed at temperatures of between 180° and 230°C in the presence of known catalysts based on transition and rare-earth metals such as tin, titanium, antimony, zinc, etc.

In the case of copolymers formed by or containing units or sequences of units X and Y, the preparation is performed in accordance with known methods by polycondensation of the diacid and the diol in the presence of the preselected lactone or lactide.

The mean numeral molecular weight obtainable by polycondensation may go up to values of the order of 100000 but it is preferably kept between 45000 and 70000.

Mean numeral molecular weights of less than 10000 do not permit the production of products having mechanical properties of practical interest.

The molecular weight can be increased by post-condensation reactions, operating either in the fused state or in the solid state, in the presence of polyfunctional compounds having groups reactive with the terminal -OH groups of the polyester, such as aliphatic or aromatic diisocyanates.

For post-condensation reactions (upgrades) in the solid state, the reaction is carried out by placing the solid resin in granular form in contact with the polyfunctional compound at ambient temperature or at a temperature slightly below the melting point of the resin for a period of time sufficient to bring about the desired increase in molecular weight.

The polyfunctional compound is used in the molten state, or dispersed homogeneously on the solid resin. Preferably, however, it is mixed with the resin in the fused state, for example, in an extruder, with periods of less than 5 minutes spent in the extruder to prevent undesired cross-linking reactions.

The intrinsic viscosity (measured in chloroform at 25°C) is increased even beyond 1 dl/g. Preferably, it is brought to values greater than 0.7 dl/g and most preferably between 0.8 and 2.5 dl/g. The viscosity of the resin in the fused state after upgrading is generally between 2000 and 30000 Pas measured at 180°C and with a "shear rate" of 100 sec^{-1}.

Diisocyanates are the preferred polyfunctional compounds acting as chain extenders; they are used in sufficient quantity to react with the terminal -OH groups of the resin. The quantity is between 0.2 and 1 equivalent of -NCO isocyanic groups per -OH group of the resin.

The quantity, expressed by weight, is generally between 0.01 and 3% of the resin, preferably between 0.1 and 2%.

The preferred diisocyanates are hexamethylene diisocyanate, diphenylmethane diisocyanate and isophorone diisocyanate.

Examples of other polyfunctional compounds which may be used are epoxides such as epoxy ethane, and the dianhydrides of tetracarboxylic aromatic acids such as pyromellitic anhydride.

The dianhydrides and the epoxides are also generally used in quantities of between 0.01 and 2% by weight of the resin.

The following examples are provided by way of non-limiting illustration of the invention.

Example 1

A polybutylene sebacate film having an intrinsic viscosity of 1.26 measured at 0.2 g/dl in chloroform at 25°C (produced by polycondensation of sebacic acid with 1,4-butandiol) was

used for the production of organic refuse sacks, bags for growing plants in greenhouses with metering of micro-nutrients, mulching films, bags for vegetables and tubers which do not sweat, or for other specific applications in which a low permeability to water vapour is required. The permeability to water vapour of this film was 250 gx30μm/m^2 per day at 38°C and 90% RH.

The film for the different applications has been produced using a Ghioldi machine for film-blowing of 40mm of diameter and L/D= 30, a temperature of 125C and 60 rpm. The head of 100mm was cooled with air at 10C.

The polymer was also found particularly suitable for the production of products which are to come into contact with liquid foods, such as thermoformed cups, drinking straws and plates for fast-food.

In case of thermoformed sheets the sheets have been produced with a mono screw extruder of 30 mm of diameter and L/D=30, using a flat head of 20cm of width. The extrusion temperature was of 13oC, the thickness was of 700 microns. The sheet has been thermoformed at 80C in a round cup. In case of drinking straws a MAI machine was used of 60mm of diameter and L/D=25. The productivity at 150C was comparable with the one of polyethylene.

Example 2

A polyhexamethylene sebacate film having an intrinsic viscosity of 0.7 dl/g (produced by polycondensation of sebacic acid with 1,6-hexandiol and subsequent upgrading with 1,6-hexamethylene diisocyanate at 60°C to give an intrinsic viscosity of 1.3 dl/g) was used for the production of organic refuse sacks, bags for growing plants in

greenhouses with metering of micro-nutrients, mulching films, bags for vegetables and tubers which do not sweat, or for other specific applications in which a low permeability to water vapour is required as in example 1.

The permeability to water vapour of this film was 180 gx30μm/m^2 per day at 38°C and 90% RH.

Example 3

Polyhexamethylene sebacate having an intrinsic viscosity of 1.3 dl/g was used for the production of single-layer and multi-layer films and sheets and for the production of containers for foods and drinks. An HAAKE RHEOCORD machine was used with a diameter of 19mm and L/D=25. The flat head had a width of 10cm. The molten film was calandered on cardboard in order to obtain an extrusion coated product for food containers.

Comparison Example 1

Polyhexamethylene adipate was used for the production of films the permeability of which was 700 gx30μm/m^2 per day at 38°C and 90% RH.

Example 4

The barrier properties of the following polymers were measured: polyethylenesebacate polynonandiol sebacate, polydecandiol sebacate, polyoctandiol azelate, polyoctandiol brassilate.

The barrier properties, expressed as permeability to vapour in gx30μm/m^2 per day (measured with a Lissy L80-4000 vapour

permeability tester at 38°C and 90% RH) were 300, 109, 100, 168, and 98, respectively.

The biodegradation behaviour according to the method described in "Journal of Environmental Polymer Degradation" vol. 4, N1, 1996, p55-63 for all the polymers fell inside the range of less than 10% of biodegradation in 14 days and more than 90% in 6 months.

CLAIMS

1. Use of compositions comprising, in quantities sufficient to ensure the required performance, polyester resins with mean numeral molecular weights greater than 10000 formed by recurring units X = $[O-(CH_2)_n-OCO-(CH_2)_m-CO]$ and/or Y = $[O-(CH_2)_k-CO]$, where the half-sum of n + m is equal to or greater than 6 and k is a number equal to or greater than 6, or by copolymers comprising units and/or sequences having the formula $x_i[O-(CH_2)_{ni}-OCO-(CH_2)_{mi}-CO]$; y_j $[O-(CH_2)_{kj}-CO]$ where: i,j = 1-5; n_i = 2-22; m_i = 0-20; k_j = 1=21;

$\sum_{i=1}^{5} x_i + \sum_{j=1}^{5} y_j = 1$ and x_i and y_j vary between 0 and 1 and are molar fractions of the various units such that

$\sum_{i=1}^{5} x_i \cdot \left(\frac{n_i + m_i}{2}\right) + \sum_{j=1}^{5} y_j \cdot k_j \geq 6$,

or by recurring units Z=$[O-(CH_2)_a-OCO-(CH_2)b-CO]$ where a=2-3, b=7-11,
present in sufficient quantity to ensure good barrier properties and biodegradability of the resins in the production of products in which a permeability to water vapour of less than 350 gx30μm/m^2 per day at 38°C and 90% RH and biodegradability in composting or burial conditions are required.

2. Use according to Claim 1, in which the polyester resins are biodegradable in composting and/or burial conditions and show decomposition in composting conditions on 30μm film of less than 10% in 14 days and more than 90% in six months.

3. Use according to Claim 1, in which the polyester resins have a melting point of between 60 and 110°C.

4. Use according to Claim 1, in which the polyester resin is produced by polycondensation of bicarboxylic aliphatic acids with from 2 to 22 carbon atoms and of diols with from 2 to 22 carbon atoms, selected in a manner such that the half-sum of the number of carbon atoms relating to the acid and to the diol is greater than 6, or by polycondensation of hydroxy-acids, or by ring-opening of corresponding lactones or lactides having from 7 to 22 carbon atoms.

5. Use according to Claim 4, in which the diacids and the dialcohols are obtained from renewable sources.

6. Use according to any one of the preceding claims, in which the polyester resin is selected from polyethylene sebacate, polybutandiol sebacate, polyhexandiol azelate, polyhexandiol sebacate, polynonandiol azelate, polynonandiol sebacate, polyoctandiol azelate, polyoctandiol brassilate, polydecandiol sebacate and polydecandiol brassilate.

7. Use according to any one of the preceding claims, in which the polyester resin has an intrinsic viscosity greater than 0.7 dl/g in chloroform at 25°C.

8. Use according to any one of the preceding claims, in which the polyester resin is subjected to an upgrading process.

9. Use according to any one of the preceding claims, in which the polyester resin is a component of a blend of unmodified or modified polysaccharides.

10. Use according to any one of the preceding claims, in which the polyester resin contains mineral or vegetable fillers and/or additives selected from lubricants, plasticizers, colourings, flavourings, perfumes, flame-

proofing agents, stabilizers with regard to hydrolysis and to thermal degradation, and antioxidants.

11. Use according to any one of the preceding claims, in which the mean numeral molecular weight of the polyester resin is between 45000 and 70000.

12. Use of polyester resins according to Claim 1 in applications in which a permeability to water vapour and a biodegradability as specified in Claim 1 are required, comprising:

- coatings which are produced by extrusion-coating, with water-vapour barrier properties, and which are usable for the packaging of fresh milk and dairy products, of meat, and of foods having high water content,
- multi-layer laminates with layers of paper, plastics material or paper/plastics material, aluminium and metallized films,
- films as such and multi-layer films with other polymer materials,
- sacks for organic refuse and for grass cuttings with periods of use longer than 1 week,
- single-layer and multi-layer food packaging comprising containers for milk, yoghurt, cheeses, meat and beverages, in which the layer in contact with the food or beverage is formed by the aliphatic polyester,
- composites with gelatinized or destructured starch, and/or complexed starch or natural starch as a filler,
- mono-directional and bi-directional films,
- semi-expanded and expanded products produced by physical and/or chemical means, by extrusion, injection, or agglomeration of pre-expanded particles,
- expanded sheet and expanded containers for foods, for drugs, and for fast food,

- fibres, fabrics and non-woven fabrics in the hygiene, sanitary and clothing fields,
- composites with mineral and vegetable fillers,
- thermoformed sheets for the food or fast-food packaging fields,
- bottles for the food, cosmetics and pharmaceutical fields,
- fishing nets,
- containers for fruit and vegetables,
- extruded sections usable in the fast-food field and irrigation pipes in the agricultural field.

13. Use of polyester resins as defined in Claim 1 in blends with other biodegradable polymers having a permeability to water vapour greater than 300 gx30μm/m^2 per day at 38°C and 90% RH.

14. Use of polyester resins as defined in Claim 1 in blends with polylactic acid.

15. Use of polyester resins as defined in Claim 1 in blends with other non-biodegradable polymers, the said polymers having a permeability to water vapour of less than 300 gx30μm/m^2 per day at 38°C and 90% RH.

16. Products which are used for uses in which a permeability to water vapour of less than 350 and preferably less than 300 gx30μm/m^2 per day at 38°C and 90% RH and biodegradability in composting and/or burial conditions are required, and which are produced from polyester resins as defined in any one of preceding Claims 1 to 11.

17. Products according to Claim 16, in the form of single-layer or multi-layer films and of products produced therefrom.

18. Products according to Claim 16 in the form of extruded films and non-woven fabrics for nappies, films for agricultural mulching, bags for special soil for plants to be grown in greenhouses, coextruded products formed by one or more layers, thermoformed and blown products for holding foodstuffs, and expanded products.

19. Products which are used in uses in which a permeability to water vapour of less than 350 gx30μm/m^2 per day at 38°C and 90% RH and biodegradability in composting and/or burial conditions are required, and which are produced from polyester resins in blends with other polymers as defined in Claim 13 or Claim 14 or 15.

20. Products according to Claim 19, in film, fibre, or sheet form, or in the form of extruded sections, or injection-moulded, moulded, or expanded products, or of non-woven fabrics.

CLAIMS

1. Use of compositions comprising, in quantities sufficient to ensure the required performance, polyester resins with mean numeral molecular weights greater than 10000 formed by recurring units X = $[O-(CH_2)_n-OCO-(CH_2)_m-CO]$ and/or Y = $[O-(CH_2)_k-CO]$, where the half-sum of n + m is equal to or greater than 6 and k is a number equal to or greater than 6, or by copolymers comprising units and/or sequences having the formula $x_i[O-(CH_2)_{ni}-OCO-(CH_2)_{mi}-CO]$; y_j $[O-(CH_2)_{kj}-CO]$ where: i,j = 1-5; n_i = 2-22; m_i = 0-20; k_j = 1-21;

$\sum_{i=1}^{5} x_i + \sum_{j=1}^{5} y_j = 1$ and x_i and y_j vary between 0 and 1 and are molar fractions of the various units such that

$$\sum_{i=1}^{5} x_i \cdot \left(\frac{n_i + m_i}{2}\right) + \sum_{j=1}^{5} y_j \cdot k_j \geq 6$$

or by recurring units Z= $[O-(CH_2)_a-OCO-(CH_2)b-CO]$ where a=2-3, b=7-11,
present in sufficient quantity to ensure good barrier properties and biodegradability of the resins for the manufacture of articles having a permeability to water vapour of less than 350 gx30μm/m^2 per day at 38°C and 90% RH, said articles showing decomposition in composting conditions on 30μm film of less than 10% in 14 days and more than 90% in six months.

2. Use according to Claim 1, in which the polyester resins have a melting point of between 60 and 110°C.

3. Use according to Claim 1, in which the polyester resin

is produced by polycondensation of bicarboxylic aliphatic acids with from 2 to 22 carbon atoms and of diols with from 2 to 22 carbon atoms, selected in a manner such that the half-sum of the number of carbon atoms relating to the acid and to the diol is greater than 6, or by polycondensation of hydroxy-acids, or by ring-opening of corresponding lactones or lactides having from 7 to 22 carbon atoms.

4. Use according to Claim 1, in which the diacids and the dialcohols are obtained from renewable sources.

5. Use according to any one of the preceding claims, in which the polyester resin is selected from polyethylene sebacate, polybutandiol sebacate, polyhexandiol azelate, polyhexandiol sebacate, polynonandiol azelate, polynonandiol sebacate, polyoctandiol azelate, polyoctandiol brassilate, polydecandiol sebacate and polydecandiol brassilate.

6. Use according to any one of the preceding claims, in which the polyester resin has an intrinsic viscosity greater than 0.7 dl/g in chloroform at 25°C.

7. Use according to any one of the preceding claims, in which the polyester resin is subjected to an upgrading process.

8. Use according to any one of the preceding claims, in which the polyester resin is a component of a blend of unmodified or modified polysaccharides.

9. Use according to any one of the preceding claims, in

which the polyester resin contains mineral or vegetable fillers and/or additives selected from lubricants, plasticizers, colourings, flavourings, perfumes, flame-proofing agents, stabilizers with regard to hydrolysis and to thermal degradation, and antioxidants.

10. Use according to any one of the preceding claims, in which the mean numeral molecular weight of the polyester resin is between 45000 and 70000.

11. Use according to Claim 1 wherein said articles are selected from:

- coatings which are produced by extrusion-coating, with water-vapour barrier properties, and which are usable for the packaging of fresh milk and dairy products, of meat, and of foods having high water content,
- multi-layer laminates with layers of paper, plastics material or paper/plastics material, aluminium and metallized films,
- films as such and multi-layer films with other polymer materials,
- sacks for organic refuse and for grass cuttings with periods of use longer than 1 week,
- single-layer and multi-layer food packaging comprising containers for milk, yoghurt, cheeses, meat and beverages, in which the layer in contact with the food or beverage is formed by the aliphatic polyester,
- composites with gelatinized or destructured starch, and/or complexed starch or natural starch as a filler,
- mono-directional and bi-directional films,
- semi-expanded and expanded products produced by

physical and/or chemical means, by extrusion, injection, or agglomeration of pre-expanded particles,

- expanded sheet and expanded containers for foods, for drugs, and for fast food,
- fibres, fabrics and non-woven fabrics in the hygiene, sanitary and clothing fields,
- composites with mineral and vegetable fillers,
- thermoformed sheets for the food or fast-food packaging fields,
- bottles for the food, cosmetics and pharmaceutical fields,
- fishing nets,
- containers for fruit and vegetables,
- extruded sections usable in the fast-food field and irrigation pipes in the agricultural field.

12. Use of polyester resins as defined in Claim 1 in blends with other biodegradable polymers having a permeability to water vapour greater than 300 gx30μm/m² per day at 38°C and 90% RH.

13. Use of polyester resins as defined in Claim 1 in blends with polylactic acid.

14. Use of polyester resins as defined in Claim 1 in blends with other non-biodegradable polymers, the said polymers having a permeability to water vapour of less than 300 gx30μm/m² per day at 38°C and 90% RH.

CLAIMS

1. Use of compositions comprising, in quantities sufficient to ensure the required performance, polyester resins with mean numeral molecular weights greater than 10000 formed by recurring units X = $[O-(CH_2)_n-OCO-(CH_2)_m-CO]$ and/or Y = $[O-(CH_2)_k-CO]$, where the half-sum of n + m is equal to or greater than 6 and k is a number equal to or greater than 6, or by copolymers comprising units and/or sequences having the formula $x_i[O-(CH_2)_{ni}-OCO-(CH_2)_{mi}-CO]$; y_j $[O-(CH_2)_{kj}-CO]$ where: i,j = 1-5; n_i = 2-22; m_i = 0-20; k_j = 1=21;

$\sum_{i=1}^{5} x_i + \sum_{j=1}^{5} y_j = 1$ and x_i and y_j vary between 0 and 1 and are molar fractions of the various units such that

$\sum_{i=1}^{5} x_i \cdot \left(\frac{n_i + m_i}{2}\right) + \sum_{j=1}^{5} y_j \cdot k_j \geq 6$,

or by recurring units $Z=[O-(CH_2)_a-OCO-(CH_2)b-CO]$ where a=2-3, b=7-11,
present in sufficient quantity to ensure good barrier properties and biodegradability of the resins in the production of products in which a permeability to water vapour of less than 350 gx30μm/m^2 per day at 38°C and 90% RH and biodegradability in composting or burial conditions are required.

2. Use according to Claim 1, in which the polyester resins are biodegradable in composting and/or burial conditions and show decomposition in composting conditions on 30μm film of less than 10% in 14 days and more than 90% in six months.

3. Use according to Claim 1, in which the polyester resins have a melting point of between 60 and 110°C.

4. Use according to Claim 1, in which the polyester resin is produced by polycondensation of bicarboxylic aliphatic acids with from 2 to 22 carbon atoms and of diols with from 2 to 22 carbon atoms, selected in a manner such that the half-sum of the number of carbon atoms relating to the acid and to the diol is greater than 6, or by polycondensation of hydroxy-acids, or by ring-opening of corresponding lactones or lactides having from 7 to 22 carbon atoms.

5. Use according to Claim 4, in which the diacids and the dialcohols are obtained from renewable sources.

6. Use according to any one of the preceding claims, in which the polyester resin is selected from polyethylene sebacate, polybutandiol sebacate, polyhexandiol azelate, polyhexandiol sebacate, polynonandiol azelate, polynonandiol sebacate, polyoctandiol azelate, polyoctandiol brassilate, polydecandiol sebacate and polydecandiol brassilate.

7. Use according to any one of the preceding claims, in which the polyester resin has an intrinsic viscosity greater than 0.7 dl/g in chloroform at 25°C.

8. Use according to any one of the preceding claims, in which the polyester resin is subjected to an upgrading process.

9. Use according to any one of the preceding claims, in which the polyester resin is a component of a blend of unmodified or modified polysaccharides.

10. Use according to any one of the preceding claims, in which the polyester resin contains mineral or vegetable fillers and/or additives selected from lubricants, plasticizers, colourings, flavourings, perfumes, flame-

proofing agents, stabilizers with regard to hydrolysis and to thermal degradation, and antioxidants.

11. Use according to any one of the preceding claims, in which the mean numeral molecular weight of the polyester resin is between 45000 and 70000.

12. Use of polyester resins according to Claim 1 in applications in which a permeability to water vapour and a biodegradability as specified in Claim 1 are required, comprising:

- coatings which are produced by extrusion-coating, with water-vapour barrier properties, and which are usable for the packaging of fresh milk and dairy products, of meat, and of foods having high water content,
- multi-layer laminates with layers of paper, plastics material or paper/plastics material, aluminium and metallized films,
- films as such and multi-layer films with other polymer materials,
- sacks for organic refuse and for grass cuttings with periods of use longer than 1 week,
- single-layer and multi-layer food packaging comprising containers for milk, yoghurt, cheeses, meat and beverages, in which the layer in contact with the food or beverage is formed by the aliphatic polyester,
- composites with gelatinized or destructured starch, and/or complexed starch or natural starch as a filler,
- mono-directional and bi-directional films,
- semi-expanded and expanded products produced by physical and/or chemical means, by extrusion, injection, or agglomeration of pre-expanded particles,
- expanded sheet and expanded containers for foods, for drugs, and for fast food,

- fibres, fabrics and non-woven fabrics in the hygiene, sanitary and clothing fields,
- composites with mineral and vegetable fillers,
- thermoformed sheets for the food or fast-food packaging fields,
- bottles for the food, cosmetics and pharmaceutical fields,
- fishing nets,
- containers for fruit and vegetables,
- extruded sections usable in the fast-food field and irrigation pipes in the agricultural field.

13. Use of polyester resins as defined in Claim 1 in blends with other biodegradable polymers having a permeability to water vapour greater than 300 gx30μm/m^2 per day at 38°C and 90% RH.

14. Use of polyester resins as defined in Claim 1 in blends with polylactic acid.

15. Use of polyester resins as defined in Claim 1 in blends with other non-biodegradable polymers, the said polymers having a permeability to water vapour of less than 300 gx30μm/m^2 per day at 38°C and 90% RH.

16. Products which are used for uses in which a permeability to water vapour of less than 350 and preferably less than 300 gx30μm/m^2 per day at 38°C and 90% RH and biodegradability in composting and/or burial conditions are required, and which are produced from polyester resins as defined in any one of preceding Claims 1 to 11.

17. Products according to Claim 16, in the form of single-layer or multi-layer films and of products produced therefrom.

18. Products according to Claim 16 in the form of extruded films and non-woven fabrics for nappies, films for agricultural mulching, bags for special soil for plants to be grown in greenhouses, coextruded products formed by one or more layers, thermoformed and blown products for holding foodstuffs, and expanded products.

19. Products which are used in uses in which a permeability to water vapour of less than 350 gx30µm/m^2 per day at 38°C and 90% RH and biodegradability in composting and/or burial conditions are required, and which are produced from polyester resins in blends with other polymers as defined in Claim 13 or Claim 14 or 15.

20. Products according to Claim 19, in film, fibre, or sheet form, or in the form of extruded sections, or injection-moulded, moulded, or expanded products, or of non-woven fabrics.